

Space Weather Forecast

From the 24th of September, the way we distribute this forecast is changing and you will need to take action to continue receiving it. You should have received an email on the 4th of September explaining the steps required to do this. If you have already signed up to receive the forecast on our premium website, please disregard this message. If you haven't, or if you need help with the process, please contact moswoc@metoffice.gov.uk

Issued on Wednesday, 11 September 2024 at 12:34 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: G1-G2 minor-moderate geomagnetic storm expected on Friday 13 September, slight chance of G3 / Strong storm. Slight chance of S1 minor radiation storm.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with a peak Moderate-class flare from a sunspot region, which has now rotated just beyond the west limb.

There are currently ten sunspot regions on the visible disc, two of which are unnumbered. Most of the active regions are now on the western hemisphere and appear to be relatively simple and stable. The largest and most complex region is located near the north central meridian. This region recently lost its delta configuration but remains magnetically unstable based on satellite imagery. It continues to display a slight growth, with the addition of a tiny spot with umbra on its southern flank and remains the most likely source of flare. The region immediately east of this appears weaker, with the loss of a couple of spots on its trailing portion. The most significant growth belongs to the new region near the solar equator in the east. It is still relatively small and simple though.

No Earth-directed CMEs have been observed during the period. Coronagraph imagery showed a south-heading CME originating from a small filament eruption. There is a significant amount of filaments present on the western hemisphere; any lift-off would probably be Earth-directed given their location on the sun.

Solar Wind / Geomagnetic Activity: The solar wind indicated a return to a slow regime. The solar wind speed fluctuated between 380-420 km/s initially but decreased down to 340-360 km/s later in the period. The magnetic field was weak and slowly decreased in magnitude, while the important north-south component became equally weak and largely positive. The net result of the above solar wind measures was for Quiet geomagnetic activity (Kp 1-2).

Energetic Particles / Solar Radiation: Solar radiation levels (10MeV protons in near-Earth environment) returned to moderate levels, with no solar radiation storm observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely to continue throughout, with a daily slight chance of Strong-class flares. The complexity and flare risk of oncoming sunspot regions is likely to exceed

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that from any departures through midweek UTC, and the overall risk is upwards around this time.

Solar Wind / Geomagnetic Activity: Two Earth-directed CMEs were in the initial forecast. The first one is largely overdue and can now be dismissed. The second one followed an M1.2 flare early on 10 Sep, expected to arrive late on Day 2 (12 Sep) or early on Day 3 (13 Sep). Enlil is currently offering a reasonable representation of solar wind conditions, and it is felt correct in delaying any fast wind arrival from CH68/- till the end of Day 4 (14 Sep).

On balance, Quiet to Unsettled conditions should persist for much of Day 1 and Day 2 (11-12 Sep), followed by an increasing risk of G1-G2/Minor-Moderate Storms early on Day 3 (13 Sep) with a slight chance of G3 / Strong Storm interval. The CME impacts probably lingering into Day 4 (14 Sep), with further Unsettled or perhaps Active intervals.

Energetic Particles / Solar Radiation: A heightened risk of flare activity brings a daily chance of reaching/exceeding the S1 Minor Radiation storm level, should any significant flares occur from active regions in the western hemisphere.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	5	1	60	20
Strong	G3	No	1	1	20	5
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	Yes	50	60	70	70
Very Active	R3 to R5 X	No	10	10	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	Yes	20	20	20	20
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)